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EXAMINER

TORRES, JOSEPH D

ART UNIT PAPER NUMBER

2133

DATE MAILED: 01/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/067,088

Applicant(s)

KYOSTI ET AL.

Examiner

Joseph D. Torres

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 8-15 and 22-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 16-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02/04/2002
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I claims 1-7 and 16-21 in the reply filed on 07/22/2004 is acknowledged.

Claims 8-15 and 22-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 07/22/2004.

Note: the Examiner acknowledges the Applicant's intent to cancel claims 8-15 and 22-25. However, the claims must be cancelled following new rules for amendments as per 37 CFR 1.121(c).

Specification

2. A definition for "time statistics" critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Note: the specification provides various examples of what "time statistics" may be, but does not include a definition. For now the Examiner assumes that "time statistics" are any statistical data or information based on data received in the time domain such as statistical data generated in a equalizer for updating tap coefficients. Clarification is required.

Claim Objections

3. The Examiner acknowledges the Applicant's intent to cancel claims 8-15 and 22-25. However, the claims must be cancelled following new rules for amendments as per 37 CFR 1.121(c).

Claims 16-21 are objected to because of the following informalities: references to the drawings must be removed since references to the drawings in the claims have no patentable weight. Appropriate correction is required.

4. Claims 1-7 and 16-21 recite the term "time statistics". Nowhere in the application is "time statistics" defined. For now the Examiner assumes that "time statistics" are any statistical data or information based on data received in the time domain such as statistical data generated in a equalizer for updating tap coefficients.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-7 and 16-21 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. A definition for "time statistics" critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Note: the specification provides various examples of what “time statistics” may be, but does not include a definition. For now the Examiner assumes that “time statistics” are any statistical data or information based on data received in the time domain such as statistical data generated in a equalizer for updating tap coefficients. Clarification is required.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-7 and 16-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recited, “estimating a channel impulse response **based on** said received signal” [Emphasis Added]. The term “based on” is indefinite.

Claim 1 recited, “a channel equalizing operation performed **on the basis of** time statistics” [Emphasis Added]. The term “on the basis” is indefinite and the term “the basis” lacks antecedent basis. Although; “based on” is indefinite it is a grammatically correct term and is how the Examiner is interpreting the term “on the basis”.

Claim 1 recited, “determining adaptive reference time domain characteristics **based on** an actual weighting information” [Emphasis Added]. The term “based on” is indefinite.

Claim 1 recited, “a reference channel equalizing operation performed **on the basis of** said adaptive reference time domain characteristics” [Emphasis Added]. The term “on the basis” is indefinite and the term “the basis” lacks antecedent basis. Although;

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"based on" is indefinite it is a grammatically correct term and is how the Examiner is interpreting the term "on the basis".

Claim 5 recited, "said correlations **are used in** said channel equalizing operation" [Emphasis Added]. The term "are used in" is indefinite.

Claim 6 recited, "said adaptive reference time domain characteristics **are used as** a channel delay spread and signal distortion metric" [Emphasis Added]. The term "are used as" is indefinite.

Claim 16 recited, "estimating a channel impulse response **based on** said received signal" [Emphasis Added]. The term "based on" is indefinite.

Claim 16 recited, "a channel equalizing operation performed **on the basis of** time statistics" [Emphasis Added]. The term "on the basis" is indefinite and the term "the basis" lacks antecedent basis. Although; "based on" is indefinite it is a grammatically correct term and is how the Examiner is interpreting the term "on the basis".

Claim 16 recited, "determining adaptive reference time domain characteristics **based on** an actual weighting information" [Emphasis Added]. The term "based on" is indefinite.

Claim 16 recited, "a reference channel equalizing operation performed **on the basis of** said adaptive reference time domain characteristics" [Emphasis Added]. The term "on the basis" is indefinite and the term "the basis" lacks antecedent basis. Although; "based on" is indefinite it is a grammatically correct term and is how the Examiner is interpreting the term "on the basis".

Claim 19 recited, "said channel equalizing means (4) **is arranged to use** said correlations" [Emphasis Added]. The term "is arranged to use" is indefinite.

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Claim 20 recited, "said reference channel equalizing means (5) **is arranged to use** said adaptive reference time domain characteristics" [Emphasis Added]. The term "is arranged to use" is indefinite.

Claims 1-7 and 16-21 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

Claim 1 recited, "estimating a channel impulse response **based on** said received signal" [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between "estimating a channel impulse response" and "said received signal".

Claim 1 recited, "a channel equalizing operation performed **on the basis of** time statistics" [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between "a channel equalizing operation performed" and "time statistics".

Claim 1 recited, "determining adaptive reference time domain characteristics **based on** an actual weighting information" [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between "determining adaptive reference time domain characteristics" and "an actual weighting information".

Claim 1 recited, "a reference channel equalizing operation performed **on the basis of** said adaptive reference time domain characteristics" [Emphasis Added]. The omitted

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structural cooperative relationships are: the relationship between “a reference channel equalizing operation performed” and “said adaptive reference time domain character”.

Claim 5 recited, “said correlations are used in said channel equalizing operation”

[Emphasis Added]. The omitted structural cooperative relationships are: the relationship between “said correlations” and “said channel equalizing operation”.

Claim 6 recited, “said adaptive reference time domain characteristics are used as a channel delay spread and signal distortion metric” [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between “said adaptive reference time domain characteristics” and “a channel delay spread and signal distortion metric”.

Claim 16 recited, “estimating a channel impulse response based on said received signal” [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between “estimating a channel impulse response” and “said received signal”.

Claim 16 recited, “a channel equalizing operation performed on the basis of time statistics” [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between “a channel equalizing operation performed” and “time statistics”.

Claim 16 recited, “determining adaptive reference time domain characteristics based on an actual weighting information” [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between “determining adaptive reference time domain characteristics” and “an actual weighting information”.

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Claim 16 recited, "a reference channel equalizing operation performed on the basis of said adaptive reference time domain characteristics" [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between "a reference channel equalizing operation performed" and "said adaptive reference time domain characte".

Claim 19 recited, "said channel equalizing means (4) is arranged to use said correlations" [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between "said channel equalizing means" and "said correlations".

Claim 20 recited, "said reference channel equalizing means (5) is arranged to use said adaptive reference time domain characteristics" [Emphasis Added]. The omitted structural cooperative relationships are: the relationship between "said reference channel equalizing means" and "said adaptive reference time domain characteristics".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. Claims 1, 3, 4, 6, 7, 16, 18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Namekata; Minoru et al. (US 5648991 A, hereafter referred to as Namekata) in view of Maalej; Khaled et al. (US 6160443 A, hereafter referred to as Maalej).

35 U.S.C. 103(a) rejection of claims 1 and 16.

Namekata teaches estimating a channel impulse response based on said received signal (Channel Impulse Response Estimator 114 in Figure 6 of Namekata teaches estimating a channel impulse response based on received signal); subjecting said received signal to a channel equalizing operation performed on the basis of time statistics derived from said channel impulse response (Maximum Sequence Estimation Process Forward Along Time Base Block 1011 in Figure 9 of Namekata provides a channel equalizing operation for the Viterbi Equalizer 126 in Figure 6 on the basis of time statistics derived from said Channel Impulse Response Estimator 114 via the Optimum Sampling Phase Decision Circuit 122' in Figure 6 of Namekata); determining adaptive reference time domain characteristics based on an actual weighting information obtained from said channel estimating step (col. 15, lines 11-30 in Namekata teaches that output 1025 $h(k)$ from the Channel Impulse Estimation Processor 1022 in Figure 10 is used to determine adaptive reference time domain characteristics 1026 r_k based on an actual adaptive tap weighting information obtained from said channel estimating step; Note: Figure 10 is the same algorithm used for both

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the forward and backward maximum likelihood sequence estimation processors 1011 and 1013 in Figure 9 of Namekata); subjecting said received signal to a reference channel equalizing operation performed on the basis of said adaptive reference time domain characteristics (Backward Maximum Likelihood Sequence Estimation Step 1316 in Figure 12 of Namekata teaches the Backward Maximum Likelihood Sequence Estimation Processor 1013 in Figure 9 subjects said received signal r_k 1020 to a backward channel equalizing operation performed on the basis of said adaptive reference time domain characteristics determined in Forward Maximum Likelihood Sequence Estimation Step 1314 in Figure 12; Note: col. 17, lines 49-54 of Namekata teach that the estimated channel impulse responses, h_{k1} and h_{k2} , calculated in Figure 9 are used as references, hence the Backward Maximum Likelihood Sequence Estimation Step 1316 in Figure 12 of Namekata is a step for subjecting said received signal r_k 1010 to a reference Backward Maximum Likelihood Sequence Estimation channel equalizing operation performed on the basis of said adaptive reference time domain characteristics determined in Forward Maximum Likelihood Sequence Estimation Step 1314 in Figure 12); and estimating channel quality by comparing output signals of said channel equalizing operation and said reference channel equalizing operation (Figure 15A-15B and col. 18, lines 19-67 of Namekata teach that channel impulse response outputs, h_1 and h_2 , of said Forward Maximum Likelihood Sequence Estimation channel equalizing operation and said reference Backward Maximum Likelihood Sequence Estimation channel equalizing operation are used to estimate channel quality by comparing output signals, h_1 and h_2 , to threshold P_{th}).

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However Namekata does not explicitly teach the specific use of bit error rate for quality.

Maalej, in an analogous art, teaches use of bit error rate for quality (Col. 9, lines 52-60

in Maalej teach that bit error rate is used to estimate channel quality; Note: BER in

Maalej is based on errors determined forward error correction by taking the difference

between the received signal and a reference or estimated signal; Note also that the

forward and backward maximum likelihood sequence estimation processors 1011 and

1013 in Figures 9 and 10 of Namekata produce an error signal e_k which is a difference

between the received signal r_k and a reference or estimated signal \underline{r}_k).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to modify Namekata with the teachings of Maalej by including use

of bit error rate for quality. This modification would have been obvious to one of

ordinary skill in the art, at the time the invention was made, because one of ordinary skill

in the art would have recognized that use of bit error rate for quality would have

provided the opportunity to use an easily calculated and widely used measure of

channel quality.

35 U.S.C. 103(a) rejection of claims 3 and 18.

See Abstract in Namekata.

35 U.S.C. 103(a) rejection of claim 4, 6, 20.

Claims 14 and 19 recite intended use language, which do not represent any structural

changes. See, e.g., *In re Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431

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(Fed. Cir. 1997) and *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971).

35 U.S.C. 103(a) rejection of claims 7 and 21.

The forward and backward maximum likelihood sequence estimation processors 1011 and 1013 in Figures 9 and 10 of Namekata produce an error signal e_k which is a difference between the received signal r_k and a reference or estimated signal \hat{r}_k over a predetermined measuring period. BER is calculated over a predetermined measuring period.

8. Claims 2, 5, 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Namekata; Minoru et al. (US 5648991 A, hereafter referred to as Namekata) and Maalej; Khaled et al. (US 6160443 A, hereafter referred to as Maalej) in view of Liang; Jen-Wei et al. (US 6314147 B1, hereafter referred to as Liang).

35 U.S.C. 103(a) rejection of claims 2, 5, 17 and 19.

Namekata and Maalej substantially teaches the claimed invention described in claims 1 and 16 (as rejected above).

However and Maalej do not explicitly teach the specific use of a matched filter.

Liang, in an analogous art, teaches use of a matched filter (col. 3, lines 15-20, Liang).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify and Maalej with the teachings of Liang by including use

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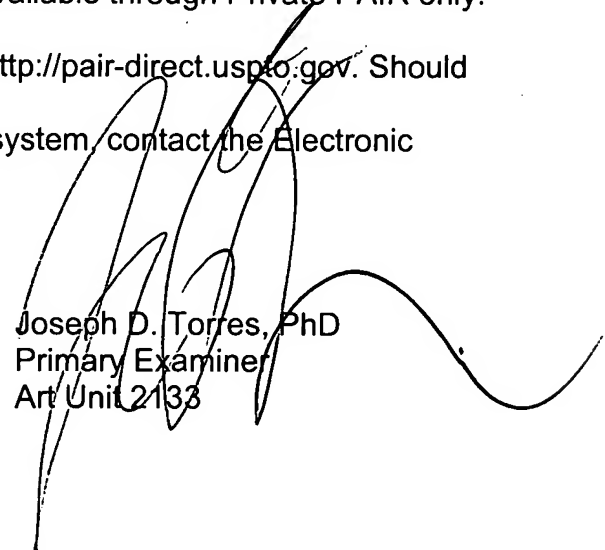
of a matched filter. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a matched filter would have provided the opportunity for Viterbi decoding in a response channel.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Art Unit 2133